Ideale favour chinecherem
MAT 104
MBBS : Matric no: 19/mhs01/409
Find the tangent equation of the tangent & Normal of the the equation.

1. $y = 2x^2$ at point $(1, 2)$

Soln

$\frac{dy}{dx} = 4x$

$m = \left.\frac{dy}{dx}\right|_{x=1} = 4(1)$

$M_1 = 4$

Then the equation of the tangent would be

Using

$y - y_2 = m(x - x_1)$

$y - 2 = 4(x - 1)$

$y - 2 = 4x - 4$

$y - 2 + 4 - 4x = 0$

$y + 2 - 4x = 0$,

OR

$y - 4x = -2$,

The equation of the normal

$M_2 M_1 = 1$

Such that

$M_2 = \frac{-1}{M_1} = \frac{-1}{4}$

$y - y_1 = m(x - x_1)$

$y - 2 = -1/4 (x - 1)$

$y - 2 = -x/4 + 1/4$

multiply through by 4

$4y - 8 = -x + 1$

$4y + x = 1 + 8$

$4y + x = 9$,

2. $y = 3x^2 - 2x$ at point $(2, 8)$

Soln

$\frac{dy}{dx} = 6x - 2$

$m = \frac{dy}{dx}\Big|_{x=2} = 6(2) - 2$

$= 12 - 2$

$m_1 = 10$

Equation of Tangent.

Using

$y - y_1 = m(x - x_1)$

$y - 8 = 10(x - 2)$

$y - 8 = 10x - 20$

$y - 8 + 20 - 10x = 0$

$y + 12 - 10x = 0$

Equation of Normal

$M_2 = \frac{-1}{M_1} = \frac{-1}{10}$

$y - 8 = -1/10(x - 2)$

$y - 8 = -x/10 + 1/5$

multiply through by 10

~~$10y + 8$~~ $10y - 80 = -x + 2$

$10y + x = 2 + 80$

$10y + x - 82 = 0$

3. $y = x^3/2$ at point $(-1, -1/2)$

Soln

$\frac{dy}{dx} = \frac{2 \cdot 3x^2 - x^3 \cdot 0}{4}$

$\frac{dy}{dx} = \frac{6x^2 - 0}{4}$

$\frac{dy}{dx} = \frac{6x^2}{4}$

$m = \frac{dy}{dx}\Big|_{x=1} = \frac{6(-1)^2}{4}$

$= \frac{6}{4} = \frac{3}{2}$

Equation of Tangent.

$y - y_2 = m(x - x_1)$

$y - (-1/2) = 3/2(x - (-1))$

$y + 1/2 = 3x/2 + 3/2$

$2y + 1 = 3x + 3$

$2y + 1 - 3 - 3x = 0$

$2y - 2 - 3x = 0$

Equation of Normal

$M_2 = -1 \div 3/2$

$M_2 = -2/3$

$y + 1/2 = -2/3(x + 1)$

$y + 1/2 = -2x/3 - 2/3$

$3y + 3/2 = -2x - 2$

$3y + 3/2 + 2/1 + 2x = 0$

$3y + 7/2 + 2x = 0$

$6y + 7 + 4 = 0$

1. $y = 1 + x$

Soln

$\frac{dy}{dx} =$

$\frac{dy}{dx}\Big|$

$m =$

$m_1 =$

Eq

$y =$

1

7 $y = 1 + x - x^2$ at the point $(-2, -5)$

Soln

$\frac{dy}{dx} = 1 - 2x$

$\left.\frac{dy}{dx}\right|_{x=-2} = 1 - 2(-2)$

$m = 1 + 4$

$m_1 = 5$

Equation of the Tangent

$y - y_1 = 5(x - x_1)$

$y - (-5) = 5(x - (-2))$

$y + 5 = 5x + 10$

$y + 5 - 10 - 5x = 0$

$y - 5x - 5 = 0$

Equation of the normal

$m_2 = -1/5$

$y + 5 = -1/5(x + 2)$

$y + 5 = -x/5 - 2/5$

$5y + 25 = -x - 2$

$5y + x + 25 + 2 = 0$

$5y + x + 27 = 0$

$y = 1/x$ at point $(3, 1/3)$

Soln

$\frac{dy}{dx} = -1 \cdot x^{-1-1}$

$\frac{dy}{dx} = -x^{-2}$

$\frac{dy}{dx} = -\frac{1}{x^2} = \frac{-1}{x^2}$

$m = \left.\frac{dy}{dx}\right|_{x=3} = \frac{-1}{3^2} = \frac{-1}{9}$

The equation of Tangent

$y - y_1 = -1/9(x - x_1)$

$y - 1/3 = -1/9(x - 3)$

$y - 1/3 = -x/9 + 1/3$

$9y - 3 = -x + 3$

$9y + x - 3 - 3 = 0$

$9y + x - 6 = 0$.

Equation of the normal

$m_2 = -1 \times \frac{9}{-1}$

$m_2 = 9$

$y - 1/3 = 9(x - 3)$

$y - 1/3 = 9x - 27$

$3y - 1 = 27x - 81$

$3y - 27x - 1 + 81 = 0$

$3y - 27x + 8 = 0$.